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13. On the Application of Electrostatic Spraying to Porcelain Enamel. (I)

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The field of application of electrostatic spraying, which already proved a good results in an American enameling shop, has been restricted only for articles of flat shape, such as a range top plate. The authors, in an attempt to extend this field of application to the domestic wares of more complicated form, made some investigations for the purpose of obtaining some basic data. The general idea based on was that we could use the electrostatic field most efficiently and hence secure the most uniform coating if it could be possible to suspend still the enamel particles in air by compensating the gravity force with the upward current of air produced by the mechanical draught in a spary booth.

From the lower end of the spray booth, composed of a vertical cylinder of 180 cm long and 50 cm in diameter, slip was injected upwards, and the air current in the booth was regulated to about 100 cm per second, which is necessary for keeping the particle at rest at the middle, by exhausting with a fan equipped at the top of the booth. Five square steel pieces having 2 cm brim and 10 square cm base were stringed successively along a vertical line at the center of the booth with copper wires of 2 cm long. A cylindrical cage of very large mesh composed of thin copper wire and 130 cm in length and 30 cm diameter, was supported by insulators to serve as a negative electrode, whose nearest distance from samples was about 10 cm so that a static voltage of 28 kilo-volt can be applied without sparking over. The specific gravity, mobility and yield value of the slip used were 1.64, 0.6 cm^4 per dyne, sec. and 10 dyne per cm respectively and the atomizing pressure was 15 to 20 lbs at the spray gun.

The authors confirmed that the uniformity of the thickness of the coating of outer surfaces can be appreciably improved by the existence of electrostatic field, for example, the thickness of coating at the vertical surfaces amounted to 60-80% of horizontal, only on which the particles may deposit by usual mechanical methods. As for the inner surfaces it seems to leave much to be improved.

Further it was confirmed that, by applying the field, the efficiency was increased as much as five times of the usual method.